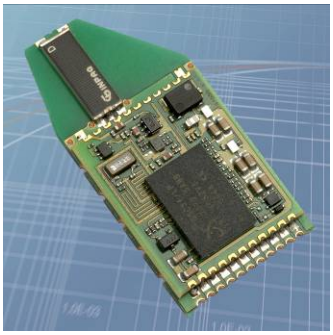
GPS Smart Antenna A1085-A

A description of Tyco Electronics'
GPS antenna modules

User's Manual - PRELIMINARY

Version 1.4
Hardware Revision 01



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Revision History

Rev.	Date	Description
1.0	11-10-06	Initial Draft.
1.1	02-09-07	Review and release
1.2	02-15-07	Reworked
1.3	02-16-07	New project name A1035-CA, clear differentiation between samples and final product
1.4	06-18-07	Final product name: A1085-A
	mm-dd-yy	

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Table of Contents

1 Introduction

1.1 Note

Please note that this is a preliminary revision of the User's Manual. The final version might differ form the herein described contents. The name A1085-A is to be considered the project name for this product.
This document explains handling of special samples provided. Please consider all remarks carefully!

1.2 Overview

Tyco Electronics' A1085-A chip antenna module is a highly integrated GPS receiver (A1080-A) combined with a small and high performance chip antenna and can be used as an SMD component. It is capable to receive signals from up to 20 GPS satellites and transferring them into position and timing information that can be read over a serial port. This new generation of GPS antenna modules combines small size and high-end GPS functionality at low power consumption:

- Operable at 3.3V / 90mW during tracking mode @ 1fix per second
- Small form factor of 33 x 16,7 mm (1.30" x 0.66")
- Small high performance chip antenna onboard
- Single-sided SMD component, for reflow soldering (only mass production units)

1.3 Characteristics

The modules are characterized by the following parameters (under full sky conditions).

Channels		20, parallel tracking
Frequency		L1 (= 1575 MHz)
Position Accuracy	Stand alone	5m CEP (SA off)
Time To First Fix – TTFF (theoretical minimum values; values in real world may differ)	Obscuration recovery (1)	1s
	Hot start (2)	2s typical
	Warm (3)	32s typical
	Cold (4)	35s typical

Table 1: A1085-A chip antenna module characteristics

(1) The calibrated clock of the receiver has not stopped, thus it knows precise time (to the µs level).
(2) The receiver has estimates of time/date/position and valid almanac and ephemeris data.
(3) The receiver has estimates of time/date/position and recent almanac.
(4) The receiver has no estimate of time/date/position, and no recent almanac.

Mechanical dimensions	Length Width Height	33mm, 1.30” 16.7mm, 0.66” 3.0mm, 0.12”
Weight		2g, < 0.10oz

Table 2: A1085-A chip antenna module dimensions and weight

1.4 Handling Precautions

The GPS antenna modules A1085-A are sensitive to electrostatic discharge (ESD). Please handle with appropriate care.

2 Quick Start

In order to allow an easy and quick start with the A1085-A antenna modules, this chapter provides a short overview on the most important steps to receive NMEA messages with position information on a serial port. For details please refer to the according chapters.

2.1 Minimum Configuration

The following picture shows a recommended minimum configuration for NMEA output and commands received and sent via an RS232 interface.

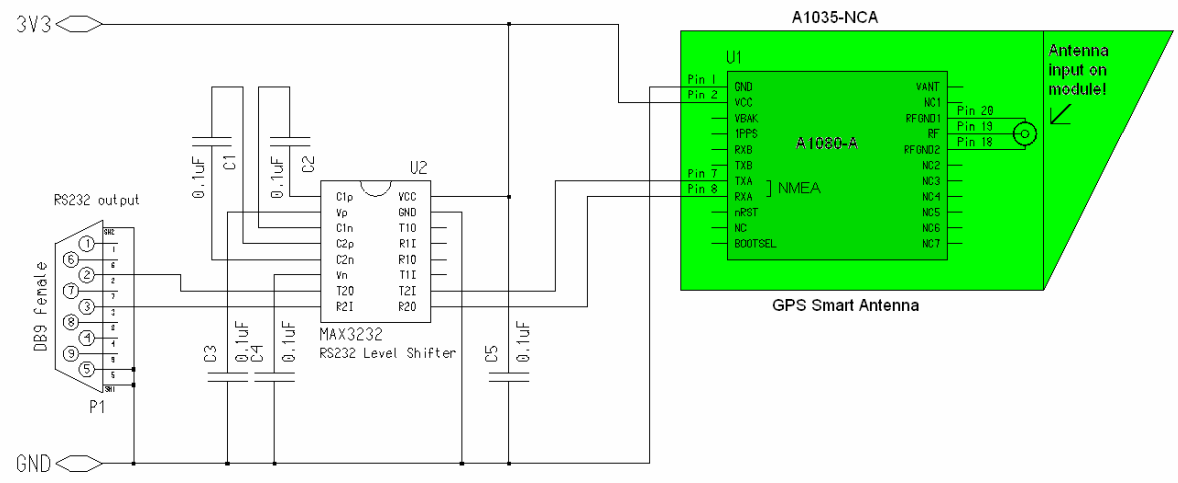


Figure 1: Recommended minimum configuration A1085-A

Remarks:

- Place C1 to C5 close to MAX3232. For capacity values see datasheet of actual component used.
- Use 3.3V level shifter (MAX3232 or equivalent).

2.2 Important Information on Samples

(1) Please make sure that the samples of A1085-A are covered to reduce the influence of temperature fluctuations.

(2) Samples of A1085-A chip antenna modules are using antistatic foam material to reduce temperature fluctuations.

(3) The antennas of these samples are adjusted and optimized for best GPS performance without any enclosure or housing, for free air condition.

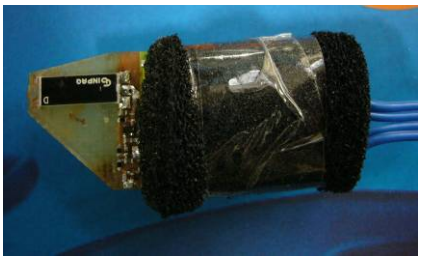


Figure 2: Foam protected chip antenna sample

2.3 Serial Port Settings

The default configuration within the standard GPS firmware is:

- Serial 0 (TXA/RXA - NMEA) 4800 baud, 8 data bits, no parity, 1 stop bit, no flow control

2.4 Improved TTFF

In order to improve the TTFF (Time To First Fix), it is recommended to support the RTC with a back-up battery when no system power is available.

If the GPS smart antenna should not be backed-up it is possible to support the re-start procedure by providing position and date/time information to the module. This is described in the firmware manual. Please refer there to chapter Start-up Support in the document T.E. GPS Firmware A1080.

2.5 Connecting EVA1035-C for Evaluation Purpose

For evaluation purpose we recommend to use the EVA1035-C board. Please connect the cable of the A1085-A antenna module as shown in the picture below.

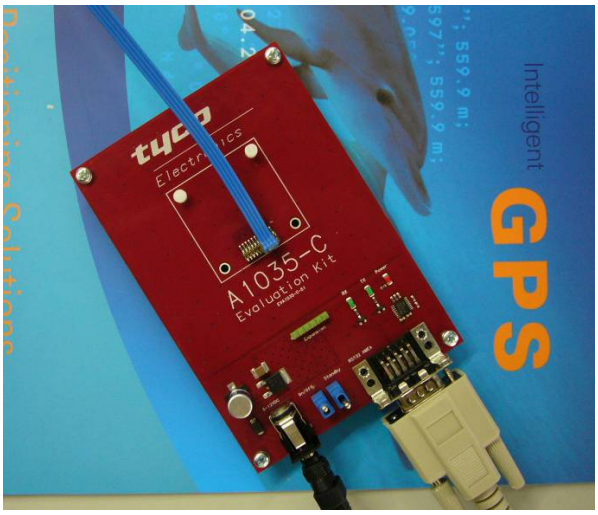


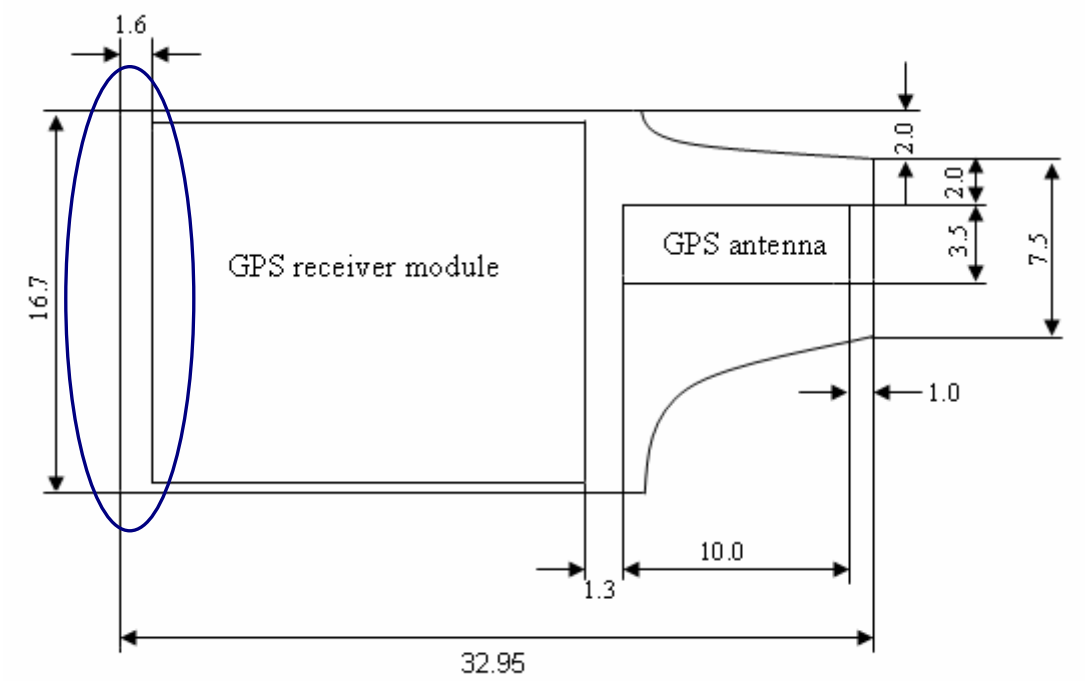
Figure 3: Connecting A1085-A sample to EVA1035-C

Figure 4: Connecting A1085-A sample to EVA1035-C (detailed)

2.6 Mechanical Outline

All dimensions in this chapter are given in mm and (inch), respectively. Tolerances are according to PCB manufacturing accuracy and usually in the range of ± 0.2mm.

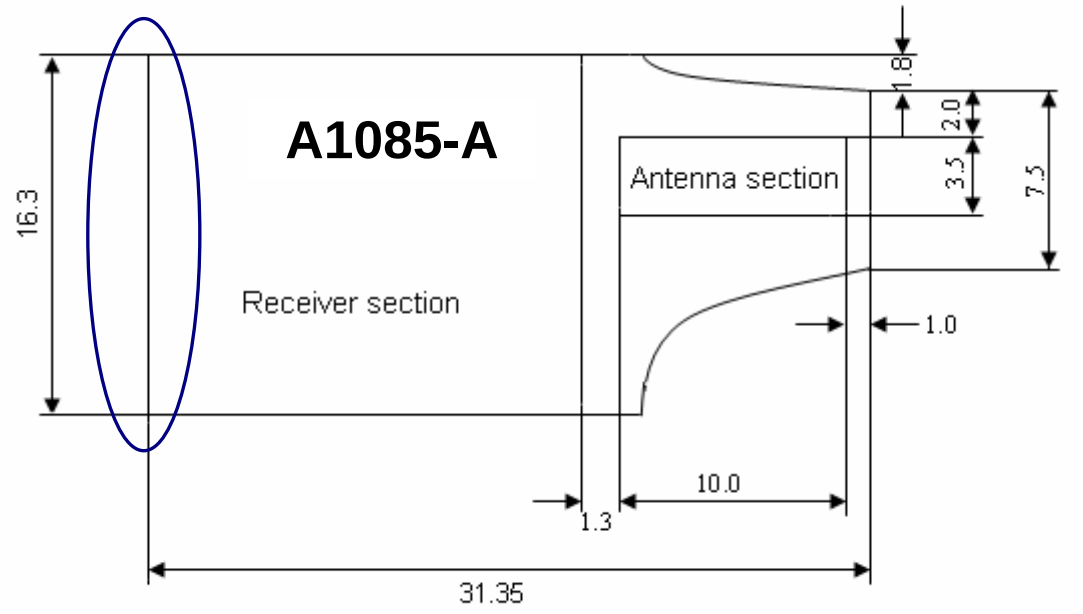
2.6.1 Outline of A1085-A Sample



Pin Out: please see below
2.6.3 Pin-out Details of A1085-A Samples

Figure 5: Outline A1085-A sample

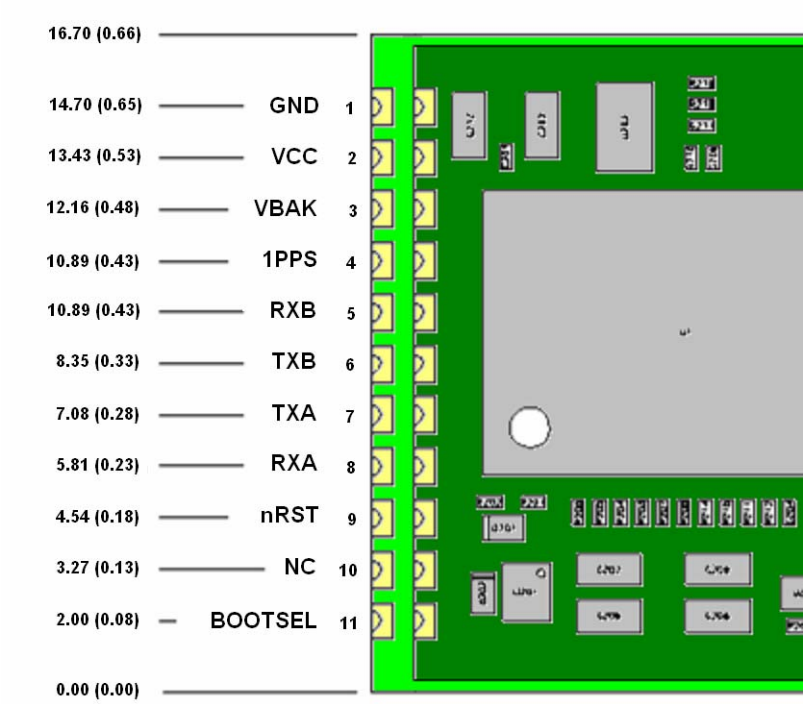
2.6.2 Outline of A1085-A Possible Standard



Pin Out: please see below
2.6.4 Pin-out Details of A1085-A Possible Standard

Figure 5: Outline A1085-A possible standard

2.6.3 Pin-out Details of A1085-A Samples

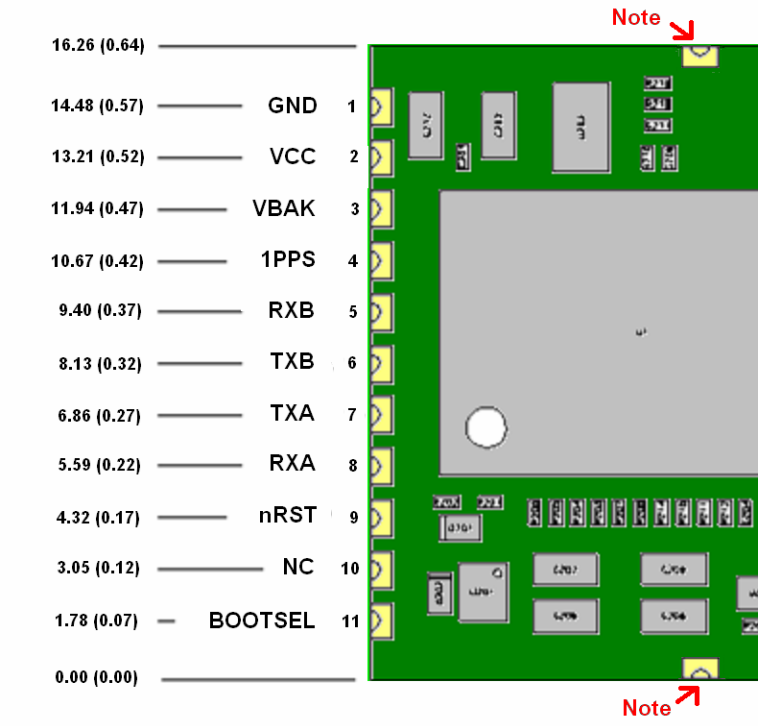


All dimensions in [mm, (inch)]

Figure 6: Pin-out details of A1085-A sample

The pin coordinates shown in the figure are center positions. Pin dimensions are 0.8 mm (width) by 1.1 mm (depth).

2.6.4 Pin-out Details of A1085-A Possible Standard



All dimensions in [mm, (inch)]

Figure 6: Pin-out details of A1085-A possible standard

Note: Additional GND solder pads will be added to each side of the module. The two shown solder pads are examples. The final position depends on electrical constraints and mechanical demands!

The pin coordinates shown in the figure are center positions. Pin dimensions are 0.8 mm (width) by 1.1 mm (depth).

2.7 Description A1085-A Signals

These tables describe the functionality of the pins and their associated symbols.

2.7.1 Pin-out

Pin	Name	Function	Comment
1	GND	Ground	
2	VCC	3.3 – 3.6 VDC	Power supply
3	Vbak	Backup supply	
4	1PPS	1 pulse per second timing signal	
5	RXB	second serial port, receive	Unused by default
6	TXB	second serial port, transmit	Unused by default
7	TXA	first serial port, transmit	NMEA out
8	RXA	first serial port, receive	NMEA in
9	nRST	Reset	
10	NC	Not connected	Do not connect
11	Boot	Boot select	Leave open for normal operation

Table 3: Pin out description

2.7.2 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
Vcc	Power supply	-0.3	+3.6	V
Vin	Voltage to any pin	-0.3	+3.6	V
Iov	Input current on any pin	-10	10	mA
Itdv	Absolute sum of all input currents during overload condition		200	mA
Tst	Storage temperature	-55	125	°C

Table 4: Absolute maximum ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

2.8 Recommended Profile for Reflow Soldering

Typical values for reflow soldering of the module in convection or IR/convection ovens are as follows:

Peak temperature	235°C
Average ramp up rate to Peak (183°C to Peak)	3°C / second max.
Preheat temperature 125 (±25°C)	120 seconds max.
Temperature maintained above 183°C	60 … 150 seconds
Time within 5°C of actual peak temperature	10 … 20 seconds
Ramp Down rate	6°C / second max.
Time 25°C to peak temperature	6 minutes max.

Table 5: Reflow soldering profile A1085-A

As results of soldering may vary among different soldering systems and types of solder and depend on additional factors like density and types of components on board, the values above should be considered as a starting point for further optimization.

3 Quality and Reliability

3.1 Environmental Conditions

Operating temperature	- 30 … + 70°C
Operating humidity	Max. 85% r. H., non-condensing, at 85°C
MSL JEDEC (Moisture Sensitivity Level)	3
Storage	6 months in original package.

Table 6: Environmental conditions

3.2 Product Qualification

Prior to product qualification the GPS receiver is preconditioned according to EIA/JEDEC standard JESD22-A113-B / Level 3.

Basic qualification tests:

- Reflow simulation on test PCB
- Temperature Cycling –30°C … +70°C
- Temperature Humidity Bias 70°C / 85% RH
- High / Low Temperature Operating –30° / +70°C
- High Temperature Operating Life +70°C
- Vibration Variable Frequency
- Mechanical Shock

Please contact Tyco Electronics for detailed information.

3.3 Production Test

Each module is electrically tested prior to packing and shipping to ensure state of the art GPS receiver performance and accuracy.

4 Related Information

4.1 Contact

This manual was created with due diligence. We hope that it will be helpful to the user to get the most out of the GPS module.

Anyway, inputs about errors or mistakable verbalizations and comments or proposals to TYCO Electronics, Power Systems in Munich, Germany, for further improvements are highly appreciated.

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4.2 Related Documents

- Manual: T.E. GPS Firmware A1080-A (TYCO)
- Manual: T.E. GPS Evaluation Kit DKS1035 (TYCO)

5 List of Tables

6 List of Figures